

CLAIMS

1. Apparatus for the cryogenic distillation of air, said apparatus comprising an assembled unit that comprises:

5 a first distillation column module within which is provided at least one cryogenic distillation column;

a heat exchange module within which is provided heat exchange means for cooling column feed air to a cryogenic distillation temperature; and
at least one further processing unit;

10 wherein the or each distillation column, said heat exchange means and the or each further processing unit are operationally interconnected and said assembled unit is suitable for transportation to and erection at a site for a cryogenic air separation plant.

15 2. Apparatus as claimed in Claim 1 wherein the heat exchange module is mounted at the base of and adjacent to said first distillation column module.

3. Apparatus as claimed in Claim 1 wherein the heat exchange module is mounted under the base of the first distillation column module.

20 4. Apparatus as claimed in any of the preceding claims wherein the diameter of the or at least one distillation column is over about 3.5m.

25 5. Apparatus as claimed in any of the preceding claims wherein the diameter of the or at least one distillation column is about 5m or about 6m.

30 6. Apparatus as claimed in any of the preceding claims wherein the first distillation column module comprises a single cryogenic distillation column, said apparatus further comprising at least one further distillation column module within which or each of which is provided at least one further cryogenic distillation column, the or at least one further distillation column module being mounted on the first distillation column module and the or each further cryogenic distillation column being operationally interconnected with the single cryogenic distillation column of the first distillation column module.

7. Apparatus as claimed in Claim 6 wherein the first distillation column module comprises a high pressure distillation column, said apparatus further comprising a second distillation column module within which is provided a low pressure cryogenic distillation column.

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8. Apparatus as claimed in Claim 7 further comprising a third distillation column module within which is provided an auxiliary distillation column or an argon side-arm column, said auxiliary distillation column or said argon side-arm column being operationally interconnected with the high and/or low pressure distillation columns.

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9. Apparatus as claimed in any of the preceding claims wherein the or each distillation column module insulates the or each cryogenic distillation column provided therein and comprises pipe work for operational interconnection of the or each column in fluid flow communication with other components of the apparatus.

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10. Apparatus as claimed in any of the preceding claims wherein the heat exchange module comprises pipe work for operational interconnection of said heat exchange means in fluid flow communication with other components of the apparatus.

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11. Apparatus as claimed in any of the preceding claims wherein the or at least one further processing unit is an air purification unit.

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12. Apparatus as claimed in Claim 11 wherein the air purification unit comprises at least two air purification vessels, each vessel comprising at least one bed of carbon dioxide and/or water adsorbent material, said vessels being arranged in parallel and configured for use in a temperature or a pressure swing adsorption process.

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13. Apparatus as claimed in any of the preceding claims wherein the or at least one further processing unit is selected from a compressor for compressing feed air or other process gases, an expander for expanding liquid or gas streams, a chiller tower for cooling process water streams, a product compressor for

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compressing distillation products, a recycle compressor for compressing recycled gas stream(s), a pump for pumping distillation products, a "deoxo" unit for removing trace oxygen from a product gas stream, a dump vaporiser for vaporising liquid inventory from the apparatus, a silencer for reducing the noise given off by any process stream, a warm heat exchanger for warming process gas streams or a DCAC for cooling and drying air discharged from a compressor.

14. Apparatus as claimed in any of the preceding claims wherein the or at least one further processing unit is a chiller tower.

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15. Apparatus as claimed in any of the preceding claims wherein the or at least one further processing unit is a storage unit for storing products from the distillation.

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16. Apparatus as claimed in any of the preceding claims wherein the or at least one further processing unit is provided within at least one further processing unit module within which is provided pipe work for operational interconnection of the or each further processing unit in fluid flow communication with other components of the apparatus.

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17. Apparatus as claimed in any of the preceding claims further comprising a framework of support members for supporting the components of the apparatus.

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18. Apparatus as claimed in Claim 17 further comprising panels provided between adjacent support members forming at least one enclosure within the framework within which is provided the or at least one further processing unit.

19. A method for the construction of apparatus as defined by Claim 1, said method comprising:

30 providing a heat exchange module within which is provided heat exchange means for cooling column feed air to a cryogenic temperature and at least one further processing unit in position relative to a first distillation column module within which is provided at least one cryogenic distillation column;

35 interconnecting operationally the or each distillation column, the heat exchange means and the or each further processing unit; and

attaching the heat exchange module and the or each further processing unit in position relative to the first distillation column module to form an assembled unit that is suitable for transportation to and erection at the site for an air separation plant.

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20. A method as claimed in Claim 19 further comprising:

providing at least one further distillation column module within which is provided at least one further distillation column in position relative to the first distillation column module;

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interconnecting operationally the or each further distillation column module and other components of the apparatus; and

attaching the or each further distillation column module in position relative to the first distillation column module.

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21. A method as claimed in Claim 19 or Claim 20 wherein the or each distillation column module and the heat exchange module comprise pipe work for operational interconnection of components of the apparatus, said method comprising connecting the components of the apparatus in fluid flow communication *via* the pipe work.

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22. A method as claimed in any of Claims 19 to 21 wherein the or at least one further processing unit is provided within at least one further processing unit module comprising pipe work for operational interconnection with other components of the apparatus, said method comprising connecting the or each further processing unit in fluid flow communication with other components of the apparatus *via* the pipe work.

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23. A method as claimed in any of Claims 19 to 22 wherein each component of the apparatus is attached directly to at least one adjacent component.

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24. A method as claimed in any of Claims 19 to 22 wherein each component of the apparatus is attached in position relative the first distillation column module by a framework of support members.

25. A method for the construction of a cryogenic air separation plant comprising constructing apparatus defined in any of Claims 1 to 18 to produce an assembled unit, transporting the assembled unit to the site for the plant and erecting the assembled unit on site.

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26. A method as claimed in Claim 25 wherein construction takes place at a dockside or a construction facility with access to a dockside prior to transportation to site by sea.

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27. Use of a first distillation column module in the construction of an assembled unit for incorporation into apparatus for the cryogenic distillation of air, said assembled unit being suitable for transportation to and erection at the site for a cryogenic air separation plant.

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28. Use of a heat exchange module in the construction of an assembled unit for incorporation into apparatus for the cryogenic distillation of air, said assembled unit being suitable for transportation to and erection at the site for a cryogenic air separation plant.

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29. Use of at least one fluid processing unit in the construction of an assembled unit for incorporation into apparatus for the cryogenic distillation of air, said assembled unit being suitable for transportation to and erection at the site for a cryogenic air separation plant.

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30. Use of apparatus as defined in any of Claims 1 to 18 in the construction of a cryogenic air separation plant.

31. Use as claimed in Claim 30 wherein the cryogenic air separation plant produces at least 3500 metric tons/day of oxygen.